

REMARKS

I. Introduction

In response to the Office Action dated August 10, 2004, claims 1, 12, and 23 have been amended. Claims 1-33 remain in the application. Re-examination and re-consideration of the application, as amended, is requested.

II. Prior Art Rejections

On page (2) of the Office Action, claims 1-3, 5-7, 12-14, 16-18, 23-25, and 27-29 were rejected under 35 U.S.C. §102(e) as being anticipated by Inohara et al, U.S. Patent No. 6,182,111 (Inohara). On page (11) of the Office Action, claims 8, 19, and 30 were rejected under 35 U.S.C. §103(a) as being unpatentable over Inohara in view of Tucker, U.S. Patent No. 6,178,519 (Tucker). On page (13) of the Office Action, claims 9, 20, and 31 were rejected under 35 U.S.C. §103(a) as being unpatentable over Inohara in view of Fleming, U.S. Patent No. 6,035,415 (Fleming). On page (16) of the Office Action, claims 10, 21, and 32 were rejected under 35 U.S.C. §103(a) as being unpatentable over Inohara in view of Fleming and Judd et al, U.S. Patent No. 5,768,623 (Judd). However, on page (19) of the Office Action, claims 4, 11, 15, 22, 26, and 33 were indicated as being allowable if rewritten in independent form to include the base claim and any intervening claims. Specifically, claim 1 was rejected as follows:

1. In regard to claim 1, Inohara teaches:

"A method of maintaining a cache in a clustered environment comprising:" (e.g., see column 3, lines 6 and 19-21).

"receiving a request in a primary node of a storage cluster for accessing data;" (e.g., see column 9 lines 28-30). For example the first server and second server taught by Inohara represent primary node and secondary node, respectively cited in the instant application.

"selecting a secondary node for storing data in cache based on a historic point of access list maintained in a cache directory;" (e.g., see column 13 lines 35-37). The access strategy table keeps records that indicate which server have the Uniform Resource Locator or URL (e.g., column 9 lines 37-39). The access strategy table also keeps records of access' date and time in the past (e.g., access history), see column 11 lines 45-47).

"forwarding modified data and symbolic information to one or more relevant nodes in the storage cluster;" (e.g., see column 9 lines 58-61). For example the URL message transmitted (forwarded) to all other servers. Each URL is in correspondence with a collection of data including character and image data.

"and updating the historic point of access list based on the symbolic information." (e.g., see column 10 lines 23-24). For example the message-processing unit renews (updates) the access strategy table.

Applicants acknowledge the indication of allowable claims, but respectfully traverse the rejections of the remaining claims for one or more of the following reasons:

- (1) Inohara fails to teach, disclose, or suggest modifying data and storing the modified data in cache;
- (2) Inohara fails to teach, disclose, or suggest storing the modified data in the cache of multiple nodes; and
- (3) Inohara fails to teach, disclose, or suggest, transmitting symbolic information (that identifies a primary and secondary node to other nodes) to other nodes in the cluster.

Independent claims 1, 12, and 23 are generally directed to maintaining cache in a clustered environment. Namely, the claims provide the ability for at least two storage nodes (identified as a primary and secondary node in the claims) in a cluster to maintain modified data in cache. In this regard, a storage node (identified as a primary node) receives an I/O request for modifying data. The modified data is stored in the cache of the primary node. However, now that the storage node has become the primary node, a node must be selected as a secondary node. The claims provide for selecting the secondary node which will also contain the modified data in its cache. The secondary node is selected based on a historic point of access list maintained in a cache directory and that identifies which node's cache contains which data. For example, as set forth in claim 4, the former primary node may be selected as the new secondary node. The new modified data and symbolic information (that identifies the primary and secondary nodes as containing the modified data) are forwarded to the appropriate nodes in the storage cluster. For example, the modified data may be forwarded to the secondary node while the symbolic information is forwarded to the remaining nodes (referred to as Remote nodes in the specification). The historic point of access list is then updated based on the symbolic information.

In view of the above, the claims provide a unique ability to maintain cache among multiple nodes in a storage cluster. The cited references do not teach nor suggest these various elements of Applicants' independent claims.

Inohara merely describes the alleviation of irregular and unstable natures of the Internet to be caused by an increase in Internet accessing users and the providing of services of an information system more comfortable to users (see Abstract). Inohara specifically provides a method for distributing data suitable for the Internet (see col. 1, lines 5-10). As set forth in col. 9, line 27 – col. 10, line 29, Inohara describes a client requesting URL contents from a first server. The first server searches cache to see if it contains the URL data and if so, it merely forwards the data to the client

and updates an access strategy table 105 to reflect the access. If the URL data is not in the first server's cache, the first server checks an access strategy table to find other servers to which the request for URL data can be forwarded. Once the URL content is sent back to the first server from a second server, the data is passed on to the client as a response. In addition, the first server adds the URL contents to its cache and informs the other servers of the storage of the URL contents in the first server's cache. Also, a frequency DB 106 stores frequency information indicating which URL contents were referred to and at what time. Further, a home page group table 107 stores a plurality of combinations of URL contents frequently requested consecutively. Based on the home page group table and frequency information, contents expected to be requested may be determined.

While the above aspects of Inohara may be useful, they do not read on the amended claims of the invention. Specifically, Inohara completely fails to provide any capability for modifying the data that is stored in the cache or for performing an I/O operation that the cache supports (as claimed). In the amended claims, the I/O request is for modifying data and storing such modified data in cache. Inohara merely provides for caching URL content and transferring such content amongst multiple servers. On the Internet, such URL content is not modified/changed, but is merely transferred and displayed. Thus, instead of receiving an I/O request for modifying data, Inohara merely describes the storage of URL content in a server (i.e., no modifications of data are possible). It is noted that the transferring of such cache data in Inohara merely provides the ability for quickly accessing URL content and does not enable nor provide any capability whatsoever for modifying or writing the data or its contents. Accordingly, Inohara fails to address a significant element of the claims. In this regard, without teaching the modification or writing of data that is stored in cache, Inohara cannot possibly teach the claimed invention.

The Office Action rejects claim 2 (that provides that the request is to write data) based on Inohara merely storing URL contents in a server. Such a rejection is completely without merit. Writing data into a cache is not the same as writing or modifying data that is stored in cache. The claims do not provide for a request for writing data in cache but for a request to write/modify data. The claims then continue to describe and provide support for the use of cache upon receiving a write request. Such a capability is not even remotely similar to that described in Inohara with respect to merely storing information in cache.

The second noted difference between Inohara and the present invention provides that the modified data is stored in multiple nodes. Again, Inohara completely fails to address modified data as set forth in the claims. Further, Inohara cannot be combined with the other references since Inohara's concept and description do not allow or even contemplate such write/modification capabilities.

The last noted difference above relates to the symbolic information. As claimed, the symbolic information identifies both the primary and secondary nodes as containing the modified data. Further, the symbolic information (that identifies both nodes) is transmitted to multiple other nodes. While Inohara provides for transmitting information that reflects the storage of URL contents in a particular server, the identification of primary and secondary nodes and transmitting the information to relevant nodes is not contemplated, described, or suggested, implicitly or explicitly in Inohara or the other references. In this regard, the claims provide and use the cache of two nodes to store data and transmits the identification of both nodes to other nodes. Inohara fails to describe such limitations.

In view of the above, Applicants submit that the various elements of Applicants' claimed invention together provide operational advantages over Inohara, Tucker, Fleming, and Judd. In addition, Applicants' invention solves problems not recognized by Inohara, Tucker, Fleming, and Judd.

Thus, Applicants submit that independent claims 1, 12, and 23 are allowable over Inohara, Tucker, Fleming, and Judd. Further, dependent claims 2-11, 13-22, and 24-33 are submitted to be allowable over Inohara, Tucker, Fleming, and Judd in the same manner, because they are dependent on independent claims 1, 12, and 23, respectively, and thus contain all the limitations of the independent claims. In addition, dependent claims 2-11, 13-22, and 24-33 recite additional novel elements not shown by Inohara, Tucker, Fleming, and Judd.

III. Conclusion

In view of the above, it is submitted that this application is now in good order for allowance and such allowance is respectfully solicited. Should the Examiner believe minor matters still remain that can be resolved in a telephone interview, the Examiner is urged to call Applicants' undersigned attorney.

Respectfully submitted,

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